



## **PANELS**

- Not allowed in restrooms (residential) or clothes closets.(required to be rated 3R if being used in wet locations)
- Required to have a clear working area of at least 30” wide, 36” deep and 6’6” tall
- See 110.26 for additional requirements for large equipment (over 1200 amps.)

### **When used as a service**

- Six or less hand movements required to remove all power in case of emergency (breakers) per lateral or feeder set.
- 800 amps or less panel must be located outside of building (municipal Code)
- 801 amps and over panel may be located inside building but must be located so that no more than 5’ of conductors are located within building without overcurrent protection. (breaker or fuses)
- Metering and meter locations are governed by the utility company with very little input from the city. We do not approve or review meter types or locations. We recommend that anyone submitting plans consult with the planners for El Paso Electric Co. prior to finalizing service design.

### **Conduit fill**

- Select tables in Annex C based on type of conduit.
- Apply adjustment factors from table 310.15b2a

### **Feeders**

- Must have sufficient capacity for calculated load. see table 310.16 for commercial and 310.15b6 for residential
- For amperages under 100 amps use 60 degree column



- For amperages over 100 amps use 75 degree column
- 90 degree column only used when determining adjustment factors and when all equipment is rated for constant operation at 90 degrees Celsius

### **Grounds**

Equipment ground – bonds equipment to panel (properly sized metal conduits may be used as equipment grounds)

### **Sizing**

- Before the service disconnecting means – use table 250.66 based on the total size of feeders.
- After service disconnecting means – use table 250.122 based on the overcurrent protection device. (if the size of the conductors is raised for any reason the size of the ground must be raised accordingly)
- Isolated equipment grounding conductor – used for delicate/sensitive equipment.
- Must be derived from last main bond ( point where neutral and electrodes are connected to stabilize system)
- Grounding electrode conductor – bonds electrodes to neutral of new system
- Use table 250.66 based on total area of derived phase conductors to size.
- Max sizes required is a – a 3/0 to metal water line or steel  
a #4 to footing/rebar  
a #6 to ground rod or plate
- System/main bonding jumper – connection from neutral to equipment
- Grounding conductors.
- Sized using table 250.66 based on total area of derived phase
- Conductors.



- No max size – if phase conductors are over 1100 mcm in area, 12 1/2
- Percent of the total area will be the size of conductor used.

Grounded conductor (neutral) – required to carry unbalanced load between phases only. (may be smaller than phase feeders, must show calculations to prove)

- **Equipment** – panels, disconnects, starters, switches etc.
  - Must have sufficient ampacity for calculated loads
  - Must be rated for the location in which it will be installed (hazardous, wet, damp, etc.)
  - Must have all working clearances and be accessible

**Overcurrent Protection** – breakers, fuses, overloads

- **Feeders/conductors**
  - Must be protected according to ampacity given on table 310.16 or 310.15 b6 (using correct column)
  - If under ampacity from tables 310.16/310.15 b6 is under 800 amps it is allowed to be rounded up to the next higher overcurrent protective device OCPD from section 240.6 if no other conductor falls in between.
  - If ampacity from tables 310.16/310.15 b6 is over 800 amps the amperage must be rounded down to next OCPD from section 240.6

**Taps** – smaller conductor spliced into a larger one

- See section 240.21 to determine what applies in each situation. (separate codes depending on specific situations- where taps are installed, how long tap conductor is, the size of the feeder being tapped, the load etc.)

**Transformers** – (separately derived systems)

- To determine ampacity use formula



- $\text{KVA rating} \times 1000 / \text{voltage} = \text{amperage}$  for single phase
- $\text{KVA rating} \times 1000 / \text{voltage} \times 1.732 = \text{amperage}$  for three phase
- Overcurrent protection device for transformers required on the secondary (see tap rules 240.21)
- See table 450.3 (b) for overcurrent protection devices of
- Transformers

### **Required lighting**

- Attics, basements, storages, points of egress,
- For maintenance of equipment (panels)
- Emergency lighting for stairwells, exits (interior and exterior)

### **Required receptacles**

- Maintenance receptacles for A/C units
- At front and rear of dwellings (only one on ground floor for apts.)

### **Required Ground Fault receptacles**

- All receptacles in commercial kitchens and prep areas, restrooms, within 6' of sinks, located
- See section 680 for GFI protection requirements around pools, spas, hot tubs, and fountains. (lighting, motors, equipment etc.)

### **Disconnecting means** – breakers, disconnects, start/stop buttons, switches etc.

- Required for motorized equipment, signs, A/C's, appliances, pumps etc.



- When required – required to be within 50’ and within sight of equipment while the equipment is being serviced.

### **Fire walls**

- A single opening for an electrical device is not allowed to be more than 16 square inches (no panels, ganged boxes, or large junction boxes)
- Multiple separate openings should not add up to more than 100 square inches in any 100 square feet.

### **Properly calculated loads**

- See Art. 220 for applicable codes and Annex D for examples
- In situations where more than one tenant will connect to a single service drop or lateral it may be necessary to request additional calculations to be sure service drop or lateral is sufficiently sized to carry load ( rule of thumb: most tenant spaces are allotted less than 60 amps worth of power no matter what size of disconnect or breaker is used

**IECC lighting calculations** – amount of lighting required based on square footage and use of building. Please supply “Comcheck” worksheets available through IECC website or google “Comcheck”

**Outdoor lighting ordinance** – section 18.18 El Paso municipal code

- **Shielding**
  - If shielding is required a fixture shield must be full cutoff ( no light is emitted above the horizontal plane at the bottom of the fixture
  - Shielding is required for any fixture whose initial output is 1800 lumens or more (rule of thumb is a 27 watt fluorescent or 60 watt incandescent)
  - Fixtures less than 1800 lumens are not required to be shielded



- Flood lights and spotlights over 1800 lumens are required to point no more than 25 degrees off the vertical line drawn from the fixture to the ground in a downward direction .
- Signs are not allowed to have up lighting no matter what lumen count (must be full cut off fixtures or tilted flood lights pointed in a downward direction).

**Lumen cap** – see table 18.18.080 of the El Paso Municipal Code

- Each project is allotted a maximum amount of lumens per acre, based on the zoning of the parcel
- All exterior fixtures are required to be included in the calculations
- Fixtures under canopies are counted at a percentage as follows:
  - less than 5' from edge = 100%
  - between 5' and 10' from edge = 25%
  - between 10' and 30' from edge = 10%
  - over 30' not counted
- For sports facilities and gas station canopies please see municipal code Article V

Verify Engineer's seal – if over 1000 square feet